DOCUMENT RESUME

ED 347 204 TM 018 735

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TITLE Evaluation in the Classroom.
PUB DATE Sep 91
NOTE 39p.; Paper presented at the Annual Meeting of the Association of Louisiana Evaluators (New Orleans, LA, September 27-28, 1991). A few pages of dot matrix print may not reproduce well.
PUB TYPE Reports - Evaluative/Feasibility (142) -- Speeches/Conference Papers (150) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Algebra; *Classroom Techniques; *Compensatory Education; Computer Software Evaluation; *Computer Uses in Education; Disabilities; *Educational Technology; Elementary School Students; Federal Programs; Intermediate Grades; Middle Schools; *Program Descriptions; Program Evaluation; Secondary Education; Secondary School Students; Special Education; Vocabulary Development; Writing Improvement
IDENTIFIERS *Education Consolidation Improvement Act Chapter 2; Videomicroscopy

ABSTRACT

Six classroom research-based instructional projects funded under Chapter 2 are described, and their outcomes are summarized. The projects each used computer hardware and software in the classroom setting. The projects and their salient points include: (1) the Science Technology Project, in which 48 teachers and 2,847 students in 18 schools used and evaluated 50 pieces of educational software, demonstrating its usefulness with middle school, junior high school, and high school students; (2) the Computer-Assisted Writing Strategies Project, in which 9 middle school special education disabled students used 6 pieces of software to improve error detection and correction in writing; (3) the Creative Writing by Computers project, in which 25 elementary school special education students, including the physically disabled, used 3 pieces of software to improve their writing skills; (4) Videomicroscopy, a project in which 49 10th-grade biology students used videomicroscopy to increase content knowledge and improve microscope skills; (5) Using Support Programs To Increase Functional Sight Vocabulary, a program to increase the sight vocabulary of 14 fifth graders in a remedial class through 6 pieces of software; and (6) Computer-Assisted Algebraic Instruction, in which 46 eighth graders used 4 pieces of software to graph algebraic equations. Program evaluations show the utility of computer software in the classroom and its potential for improving instruction. Thirty-one references are included. (SLD)

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Evaluation in the Classroom

ED347204

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Paper Presented at the Annual Meeting of the
Association of Louisiana Evaluators

September 27-28, 1991

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Science Technology Project

October 30, 1990

Science Technology Project
Chapter 2 Component
Consolidated Educational Programs

Chapter 2 guidelines require that a link be established between the instructional projects funded through Chapter 2 and the academic achievement of the students involved in these instructional projects.

Fieldtest Design for Science Technology Project

Procedure:

1. Review science curriculum and the software purchased for the science technology project.
2. Choose software to be used in class.
3. Complete initial reporting form.
4. Get approval for implementation.
5. Conduct pre-test, if appropriate.
6. Use software as part of instructional program.
7. Conduct post-test and and distribute evaluation forms (students).
8. Complete final reporting form.

Classes to be involved:

a. Middle/Junior high schools: 3 separate fieldtests per school, i.e., 3 different pieces of software.
b. High school: 1 fieldtest per subject per school, i.e., one piece of software from each subject area to be used as part of the instructional program.

Evaluation Measures

Pre-tests/measures: In some cases pre-requisite skills are needed. To the degree that the absence or presence of certain skills will impact student achievement, these skills should be assessed prior to beginning the fieldtest. Ex. If students need to be able to make calculations in order to use a piece of equipment, a pre-test of math calculation skills may be appropriate.

Post-tests/measures: All projects must have at least one post measure which assesses student performance/achievement as stated on initial reporting form. Ideally, two or more measures should be used. These measures may be a checklist of student performance, such as an assessment of a student's ability to use a microscope or complete an experiment, a score obtained on a teacher made test, a grade given to a student research paper, or a report card grade.

N.B. Evaluation data will be entered on the final reporting form.

Initial Reporting Form
Science Technology Project
Chapter 2

Teacher's Name:_____ Date:_____

Subject:_____ Unit/Chapter:_____

Class:_____ Class enrollment:_____

Software Title(s):_____

_____

Instructional Objective(s): _____

_____

_____

Starting Date:_____ Ending Date:_____

Student Enrollment
(Participating Students)

	Boys	Girls
Am. Indian	____	____
Asian	____	____
Black	____	____
Hispanic	____	____
White	____	____

Pre-test/measure:
Explain measure to be used and grading/assessment scale.

_____

_____

Post-test(s)/measure(s);
Explain measure to be used and grading/assessment scale.

_____

_____

Final Reporting Form
Science Technology Project
Chapter 2

Teacher's Name:_____ Date:_____

Subject:_____ Class:_____

Software Title(s):_____

_____

Student Enrollment: _____

Assessment Data:

Pre-test/measure: _____

_____

# of students:_____

Results: _____

_____

_____

_____

_____

Post-test/measure(s): _____

_____

# of students:_____

Results: _____

_____

_____

_____

*Results may be recorded on another form and attached to this report.

Student Evaluation Form
Science Technology Project
Chapter 2

Subject:_____

Grade:_____

1. Is this the first time you have had a class where computers were used frequently as part of the lessons?

Check one: Yes___ No___

2. If you checked yes, please tell us where and how you used computers in other classes.

_____

_____

3. What did you like best about using the computer in your science class?

_____

_____

4. What did you like least about using the computer in your science class?

_____

_____

5. Do you have any recommendations for using the computer in your science classes?

_____

_____

Teacher Evaluation Form
Science Technology Project
Chapter 2

Subject:_____

Grade:_____

1. Have you used computers as part of your instructional program before this project?

Check one: Yes ___ No ___

2. If yes, where and how did you use computers?

---

3. Rate the following in terms of the software provided for your subject:

	Excellent	Good	Fair	Poor
a. ease of use	_____	____	____	____
b. consistent w/ material in text	_____	____	____	____
c. interesting	_____	____	____	____

4. What did you like most about using the computer in your science class?

---

5. What did you like least about using the computer in your science class?

---

6. What changes, additions, modifications, etc. would you recommend for next year?

Projected Use Form
Science Technology Project

School:_____

Please complete this form for those teachers planning to use the computer software in science classes after February 18, 1991. Note: Do not include those teachers who have submitted an initial reporting form.

Teacher	Subject	Software Title	Starting Date

Summary Data
Science Technology Fieldtests
June 13, 1991

A. Number of Participating Schools: 18

B. Number of Participating Teachers: 48

C. Number of Participating Students: 2847

D. Distribution of Subjects:

Subject	# of Fieldtests
6th grade science	2
Biology	5
Chemistry	4
Earth Science	6
Environmental Science	6
Life Science	7
Physical Science	18
Physics	4

E. Student Descriptors:

N = 2807

Sex - 1309 (47%) males
1498 (53%) females

Ethnicity -		
American Indian	6	<1%
Asian	185	6%
Black	723	25%
Hispanic	304	11%
White	1589	57%

F. Number of Different Pieces of Software Fieldtested: 50
(See attachment for listing.)

Listing of Software Titles
w/evaluations

Software Title

Acids and Bases
Air Pollution
All About Matter and Energy
Astronomy
Balance
Baseball Game: Chemistry
Baseball Game: Physics
Cell Theory
Charged Particles in Electric Field
Chemicals of Life I
Circuits
Collisions
Cytology and Passive Transport
DNA Master Molecule
Ecosystems
Electricity
Graphs: Heat and Temperature
Ground Water
Ground Water/Surface Water
How Plants Grow
Human Processes I
Human Processes II
Hydrologic Cycle
Machines, Work, Energy
Mendelbugs
Mendelian Genetics
Modern Genetics
Molecules and Atoms
Niche
Odell Lake
Physical Science Experiments
Physics: Teach to Learn

Software Title

Quiz Grid: Chemistry
RAST
Scientific Models: Batt/Bulbs/Families
Sound and Light
Sound and Light Energy
Sound: Making Waves
Surface Water
Temperature/Changes in Soil
Temperature/Experiment
The Environment I
The Environment II
The Skeletal System
Theory Formation: Reflections/Patterns
Tool Kit/Motion
Tool Kit/Valence Number
Voltage, Current, and Resistance
Water Pollution
Weather Forecast
Weather Machine
Writing Chemical Formulas

Vendors:

Queue, Inc.
562 Boston Ave.
Bridgeport, CT 06610

Programs for Learning
5108 Desiard Road
Monroe, La. 71203

IBM - Science ToolKit

Cambridge
42 Fourth St.
Waltham, MA. 02154

CEP
Science Project

Classroom Hardware

Item	Description	Approximate Price
IBM PS/2, Model 30	8086 based CPU w/30 Meg HD, VGA color monitor, 1 - 3.5" DD, full size keyboard - NOTE: This item is no longer available, however IBM has positioned the 80286 based PS/2, Model 30-286 in the same price range.	$ 1,250.00
IBM Proprinter	Cheapest, 9 pin, narrow carriage, dot matrix printer available from IBM under contract, w/cable	400.00
Apple IIgs	Apple IIgs Professional System, w/1 - 3.5" DD, 1 - 5.25" DD, RGB color monitor	1,700.00
Apple Imagewriter II	Apple dot matrix printer w/cable	425.00
Mitsubishi 33" Monitor	Mitsubishi Color Monitor, Model No. XC-3310C w/model no. XS-0103 stand	4,000.00
Total		**$ 7,775.00**

Writing Projects

Evaluation

Computer-Assisted Writing Strategies
Meisler Junior High - Special Education Class

May 23, 1989

Chapter 2 Research Based Instructional Project Component
Consolidated Educational Programs

Prepared by

Shirley Becnel
Coordinator for Technology and Research

Evaluation

Computer-Assisted Writing Strategies

Goal: To improve the writing skills of disabled learners in the area of error identification and correction.

Objectives:

1. Students will be able to identify spelling, capitalization, and ending punctuation errors in written samples.
2. Students will be able to correct spelling, capitalization, and ending punctuation errors in written samples.

Expected Outcomes:

1. 90% of the students will demonstrate mastery of spelling, capitalization, and ending punctuation in original written language samples with 100% accuracy, when computer assisted software and teacher assistance are provided.
2. 90% of the students will demonstrate mastery of spelling, capitalization, and ending punctuation in original written language samples with at least 50% accuracy, after utilizing the computer software.

Population: Seven to fifteen (15) middle school special education students in a mild/moderate generic, self-contained English class.

Academic Level: All of these students exhibit learning difficulties in English and are unable to function in more than two regular classes outside of special education.

Treatment: Students, under the supervision of the special education teacher and the speech/language pathologist, will participate in the following:

a. orientation
b. pre-test
c. typing drills
d. teacher instruction
e. independent practice
f. post-test

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Analysis of Data: N = 12

Nine (9) students participated in the pre and post testing. The post-test consisted of measures in the areas of capitalization, punctuation, spelling, and original sentence construction using the word processor.

Results: 7 of 9 students increased their scores in the area of punctuation with a mean increase of 19%. 8 of 9 students scored 100% in their post-measure in the area of capitalization. The other student showed an increase also. In the area of spelling, 5 of 9 student showed an increase with a mean increase of 8%.

PMI Summary: In addition to the specific skills measured by the post-tests, the teacher and speech pathologist reported improvement in the student's ability to complete sentences, write longer, more complex sentences, to vary their sentence structure, and to proof read their work. The students reported a increased feeling of independence when using the computer.

Conclusions: Program objectives were achieved with a significant level of success in the area of punctuation.

Specs for Writing Project
Middle School Special Education Class

Software:

Talking Text Writer - Scholastic
Banks Street Writer - Scholastic
Painless Punctuation - Orange Cherry Tree Software
Grammar Examiner - Learning Arts Software
Grammar Gremlins - Learning Arts Software
Postwriting - Milliken Software

Hardware: Apple IIe w/ECHO boards
Imagewriters
Super serial cards
8 pin printer cables
2 external drives

Evaluation

Creative Writing by Computers
Matas Elementary-Special Education Department

May 23, 1989

Chapter 2 Research Based Instructional Project Component
Consolidated Educational Programs

Prepared by

Shirley Becnel
Coordinator for Technology and Research

Evaluation

Creative Writing by Computers
Matas Elementary-Special Education Department

Goal: To increase by 30 the number of handicapped students using computers for written expression.

Objectives:

1. To teach handicapped students to use a writing method which is within reasonable parameters for them as measured by the produced paragraphs.
2. To increase the number of pieces of written expression generated by these handicapped students as measured by their respective teachers.
3. To teach handicapped students to write creative and descriptive paragraphs rather than give one or two-word responses as measured by a display of stories produced.

Expected Outcomes:

1. 90% of the students (27) will have used the equipment successfully.
2. 90% of the students (27) will generate at least three (3) stories or paragraphs.
3. A total of 100 stories or paragraphs will be generated by the students.

Population: 30 special education students

-13 orthopedically handicapped students
-17 mild/moderate students

Academic level: Achievement levels range from kindergarten to fifth grade. Some students have been identified as learning disabled or mildly mentally handicapped.

Treatment: Using microcomputers with adaptive hardware, students generated stories via a word processing program-Language Experience Recorder. Having composed their stories as part of their language arts classes, the students then entered the data through direct keyboard entry or via an adaptive device (Magic Slate). Teacher assistants entered story data for the students unable to manipulate the keyboard because of physical limitations.

Analysis of Data: N=30

Twenty-five (25) students (83%) actively participated in the project. Five (5) students did not participate because of illness, mainstreaming (scheduling conflicts), or a dislike for the computer.

Twenty-five (25) students achieved the project objectives.

Twenty-one (21) students (70%) wrote three or more stories.

One hundred seventy-two (172) stories/paragraphs were written.

Twenty-five (25) student booklets were printed. Booklets will be displayed and then returned to students.

PMI Summary:

Participating teachers were asked to complete a PMI re: the word processing program, Language Experience Writer. A review of the surveys yielded the following information:

-Software gives story analysis including a list of words used and average word length.

-Software is easy to use and printed copy provides immediate reinforcement.

-Readability formula used in software relies exclusively on count of syllables per sentence. This does not always reflect an accurate assessment of sentence/paragraph structure (readability and comprehensibility).

Conclusion:

The writing samples show an incremental increase in sentence length and complexity commensurate with students' achievement levels. The adaptive devices were effective tools and the ability to adjust print size was an assest to both the academic and motivational aspects of the project.

Specs for Writing Project
Elementary Special Education Class

Software: Language Experience Recorder - Teacher Support Software
Sentence Starter - Teacher Support Software
Magic Slate II - Sunburst Communications

Hardware: Magic Slates w/adaptors
Apple IIe w/80 column card
Graphics printer

Videomicroscopy

Evaluation

Use of Videomicroscopy in Improving Observational Skills and Understanding of Selected Biological Concepts Higgins High School-Biology

June 12, 1989

Chapter 2 Research Based Instructional Project Component
Consolidated Educational Programs

Prepared by

Shirley Becnel
Coordinator for Technology and Research

Evaluation

Use of Videomicroscopy in Improving Observational Skills and Understanding of Selected Biological Concepts

Goal: To improve the students' ability to identify biological structures and processes via a microscope.

Objectives:

1. To teach students to use the microscope.
2. To teach students to identify microscopic organisms via the videocamera technique and via individual microscopes.
3. To teach students to identify an unknown substance by observing its effects on the heartbeat rate of a microorganism, the Daphnia.

Expected Outcomes:

1. All students (100%) will receive instruction using videomicroscopy.
2. All students (100%) will demonstrate a proficiency in the use of a microscope as a method of identifying microorganisms.
3. All students (100%) will be able to:
   a) identify the parts of a normal and plasmolyzed elodea cell;
   b) identify the structures of a plant cell;
   c) identify the structures of an animal cell;
   d) identify the microorganizm, the Daphnia;
   e) identify an unknown substance as a stimulant or a depressant by observing its effects on the heartbeat rate of the microorganizm, Daphnia; and
   f) identify various protozoa and invertebrates found in pond water.

Population: Two average classes of 10th grade biology students.

Academic Level: All students scored below the 77th percentile on the science section of the CAT.

Treatment: Students will be given traditional instruction in the following areas of the biology curriculum:

-normal and plasmolyzed cells
-the Basic Unit of Life (Part II)
-how drugs affect the heartbeat rate
-observing pond water.

After this instruction, students will be pretested on knowledge of structures and processes. Students will then be given instruction using videomicroscopy as an enhancement to traditional instruction. Students will then be posttested on the knowledge of structures and processes. The posttest will occur during a lab practical exam.

Analysis of Data: N=25 (class 1)
N=24 (class 2)

Three assessments were made. These were:

-activity 1: How do drugs affect the heartbeat rate?
-activity 2: The Basic Unit of Life-Part II
Normal and Plasmolyzed Cells
-activity 3: Observing Pond Water

The mean scores by class are as follows:

Class	Activity 1		Activity 2		Activity 3	
	Pre	Post	Pre	Post	Pre	Post
1	13.8	18.0	8.6	16.2	12.2	15.9
2	12.0	16.5	8.6	14.4	9.8	13.6

All students (100%) were able to use the microscope correctly and were able to identify cells as described in expected outcomes.

PMI Summary:

The observations made by the teacher and by students during an on-site visit indicated both a sustained interest in the project as well as an understanding of the equipment as related to classroom instruction.

Conclusions: The project was designed to achieve two objectives. The first was to implement an innovative teaching device within a regular science class. As this was the first time that the videomicroscope was used, the first level of assessment involved an evaluation of the equipment, i.e., its ease of use, its application within the instructional program, etc. The equipment did function as anticipated and proved to be a useful instructional device.

The second objective was to measure the degree to which this instructional device impacted the academic performance of the participating students. Although the device was used as part of a second level of instruction in specific biology topics, the device proved to be a useful tool as the visual presentation of materials confirmed the students knowledge base and provided extended reinforcement.

Specs for Videomicroscopy Project

Videomicroscope

CYNMAR Corporation
E & L Microscope and Balance Co.
PO Box 498
131 North Broad Street
Carlinville, IL 62626
(217) 854-3517

Package includes:
- Javelin color camera
- Power supply
- Power cord
- Sony color monitor
- Cables
- Microscope
- Mount for camera

Panasonic Irdustrial VHS Recorder (AG1240)

Sight Vocabulary Project.

Evaluation

Using Support Programs to Increase Functional Sight Vocabulary
Greenlawn Terrace School-R.E.A.L. Program

May 23, 1989

Chapter 2 Research Based Instructional Project Component
Consolidated Educational Programs

Prepared by

Shirley Becnel
Coordinator for Technology and Research

Evaluation

Using Support Programs to Increase Functional Sight Vocabulary
Greenlawn Terrace School-R.E.A.L. Program

Goal: To increase fourteen (14) R.E.A.L. students' proficiency in using functional sight vocabulary through the use of computer software.

Objectives:

1. To teach students to use computers as part of the regular reading class.
2. To teach students the vocabulary strategies presented in the software packages.
3. To provide guided practice in the vocabulary exercises presented in the software package and the reading series.
4. To reinforce students' vocabulary via computer assisted instruction.

Expected Outcomes:

1. All students (100%) will demonstrate mastery in the use of the classroom computers and the software packages.
2. Ten (10) of the students (71%) will improve their functional sight vocabulary as measured by a growth of at least one level of assessment (Burns and Roe vocabulary test).

Population: 14 fifth grade students assigned to a R.E.A.L. class

Academic level: According to the Burns and Roe assessment, the independent vocabulary levels of the students were:

4 students	pre-primer level
2 students	first grade level
8 students	second grade level

Treatment: Each student received 30 minutes of CAI instruction daily during the language arts block.

Analysis of Data: N=14

Fourteen (14) students actively participated in the project.

All fourteen (14) students (100%) improved at least one level as measured by the Burns and Roe assessment. Ten (10) students improved two levels and one (1) student improved three levels.

PMI Summary:

The participating teacher made the following observations regarding the project:

-The software used in the project (Wordworks, Semantic Mapper, and Language Experience Recorder) provided continual reinforcement for students as the software was correlated to the basal reading text used in the project.

-Student spelling skills improved.

-The immediate feedback provided by the computer software served as a motivational device. Students were motivated to attempt more difficult material.

-The Excel-A-Read software package was not useful in that the readability level was too high (5th grade) and the information presented in the program was too fast paced.

Conclusion:

There appears to be a direct link between the improved vocabulary scores of the participating students and the implementation of the CAI program. Linking the software to the vocabulary used in the basal text while supplementing the basal with comparable skills lessons presented by the teacher and via the computer appears to be an effective way to addressing the vocabulary deficit for this population.

Specs for Sight Vocabulary Project

Software: Semantic Mapper - Hartcourt, Brace, Jovanovich
Word Works - HBJ
Word Parts, Levels I, II, and III - HBJ
Language Experience Recorder Plus - Teacher Support Software
Excel-A-Read - American Educational Computer
Burns Informal Reading Inventory

Hardware: Apple IIe
Imagewriter printer
Printer cables

Algebraic Instructional Project

Evaluation

Computer-Assisted Algebraic Instruction
Meisler Junior High - Math

May 24, 1989

Chapter 2 Research Based Instructional Project Component
Consolidated Educational Programs

Prepared by

Shirley Becnel
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Evaluation

Computer-Assisted Algebraic Instruction
Solving and Graphing Equations

Goal: To improve students' ability to solve algebraic equations.

Objectives:

1. To emphasize problem solving techniques in solving equations.
2. To present quick and accurate visual graphing of equations.

Expected Outcomes:

1. All participating students (100%) will receive instruction using the graphing software.
2. All students (100%) will use the software to graph algebraic equations.
3. 80% of the students will receive a grade of 85 or better on the post-measure test which will require the students to solve equations.

Population: Two 8th grade Algebra I classes.

Academic Level: All students will have been identified as high level II (above average) or level I (high and/or honors) math students.

Treatment: Students will receive regular instruction as defined in the curriculum guides and will use the regular textbook. The variance in instruction for these classes will be the use of a large screen monitor and algebraic software.

Analysis of Data: N = 25 (class 1)
N = 21 (class 2)

A delay in the receipt of the materials limited the use of the software for this project. However, the students were instructed in the use of the software and all students (100%) demonstrated proficiency in the use of the software as a problem solving tool. The post-test showed that 100% of the students were able to score 85 or better on the equation items.

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PMI Summary:

The observations made by the teacher and the students indicated that the software was easy to use and did provide a quick, accurate, visual model for graphing equations. However, the clarity of the software on the screen was below average. The software was easiest to see when the classroom was very dark. This restricted the use of the software as the math classroom had one wall of windows which front a major thoroughfare and it was often difficult to achieve the optimum level of darkness needed to use the software.

Conclusions: The project was designed to achieve two objectives. The first objective was achieved in that the students were able to adapt to and use the software with a minimum amount of training and the software content was consistent with the required curriculum.

The second objective focused on the visual presentation available through the software and monitor. The clarity of the software was limited, but the accuracy and presentation of the graphs was excellent. The software showed quickly and effectively the changes in a graph as alternate values were entered into the equations. Both the students and the teacher felt that the accuracy and swiftness of changes exceeded their expectations.

Recommendations for Further Study: New algebraic software packages with VGA and EGA graphics will be reviewed and at least one other package will be included in next year's project.

Specs for Algebraic Instructional Project

Software:

Success with Algebra Series - Educational Resources
Mission: Algebra - Designware, Inc.
Alge-Blaster - Davidson and Associates, Inc.
Green Globs and Graphing Equations - Sunburst Communications

Hardware: IBM CGA computer ZVM-134-2
Zenith Color Monitor/Receiver Model VC 2562

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